

# CONSERVATION AND SUSTAINABILITY: NETWORKS CONNECTING RUMO S.A.'S RAILWAY SYSTEMS IN BRAZIL

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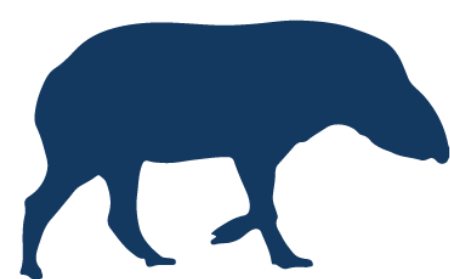
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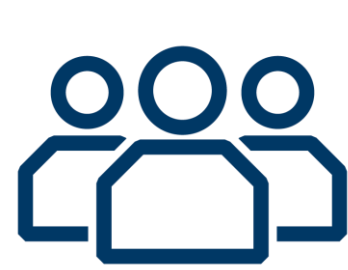
## BACKGROUND



The installation and operation of railways can result in habitat fragmentation and mortality due to wildlife collisions.



Therefore... Sustainable practices must go beyond legal compliance.



Multidisciplinary integration of environmental professionals working on railways, along with service providers and the academic community, has been essential.



Currently, several initiatives are underway to reduce wildlife mortality, including the construction of wildlife overpasses and underpasses, and ecological overpass, based on wildlife collision prediction models. Additionally, structures have been implemented between railroad ties to facilitate the passage of turtles and other small animals. Another innovative initiative involves installing sound deterrents to keep wildlife away from the tracks.

## OBJECTIVE

We conducted a study on ecological interactions between native wildlife and plants, using the findings to guide targeted revegetation efforts beyond mandatory environmental compensation

## METHODS



For this study, a survey was conducted based on data from the environmental impact study and the forest plans of the project.



Analyses of species suitable for planting and their associations with fauna, with a focus on endangered species, were carried out using the Bipartite package in the R 4.3.2 software. The network analyses were conducted based on Bascompte et al. (2003) and Jordano et al. (2006)

Our study analyzed 64 tree species and their associated pollination syndromes



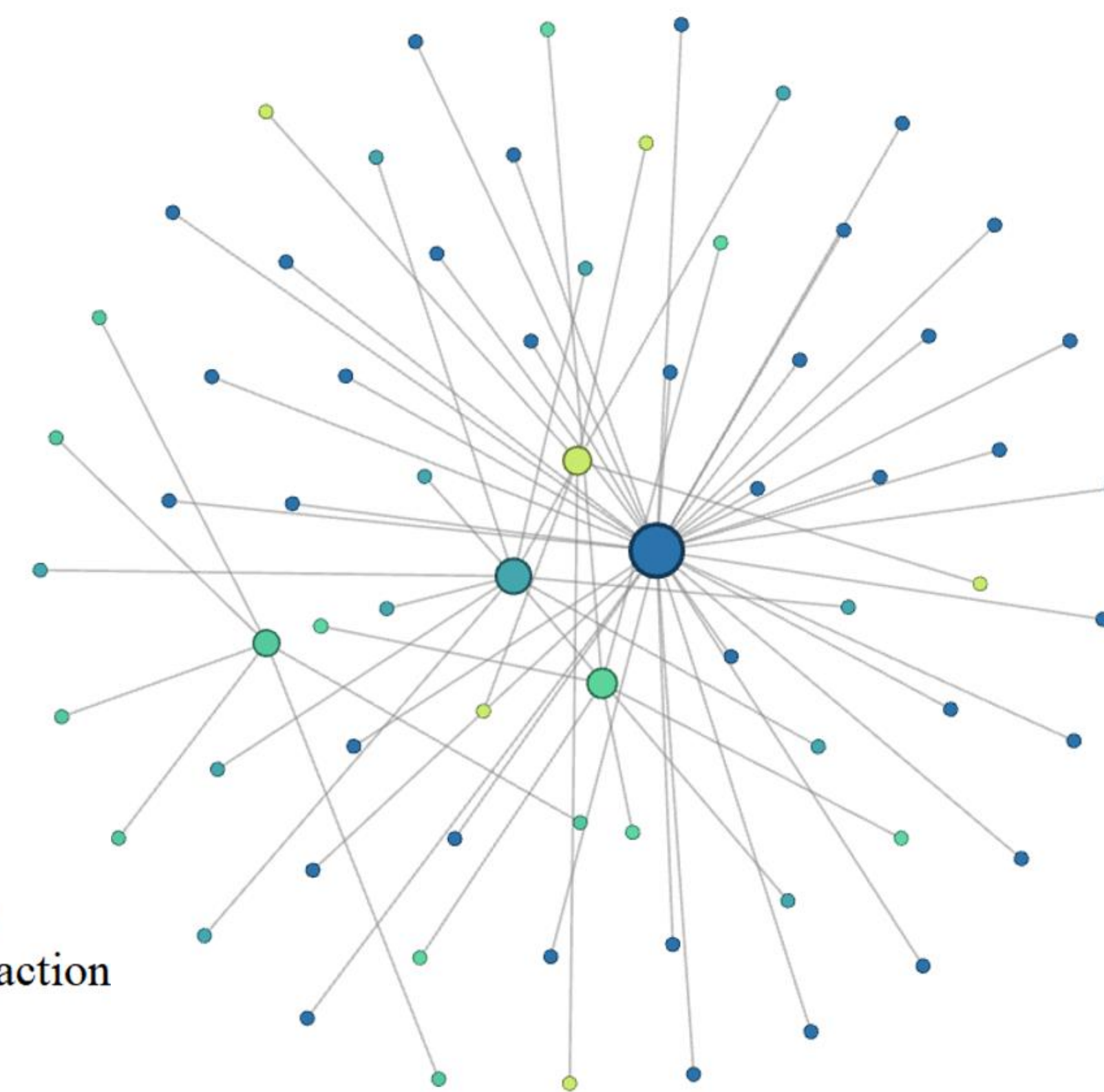
Additionally, 26 wildlife species feed on these trees.



## RESULTS

### Plants and pollinators

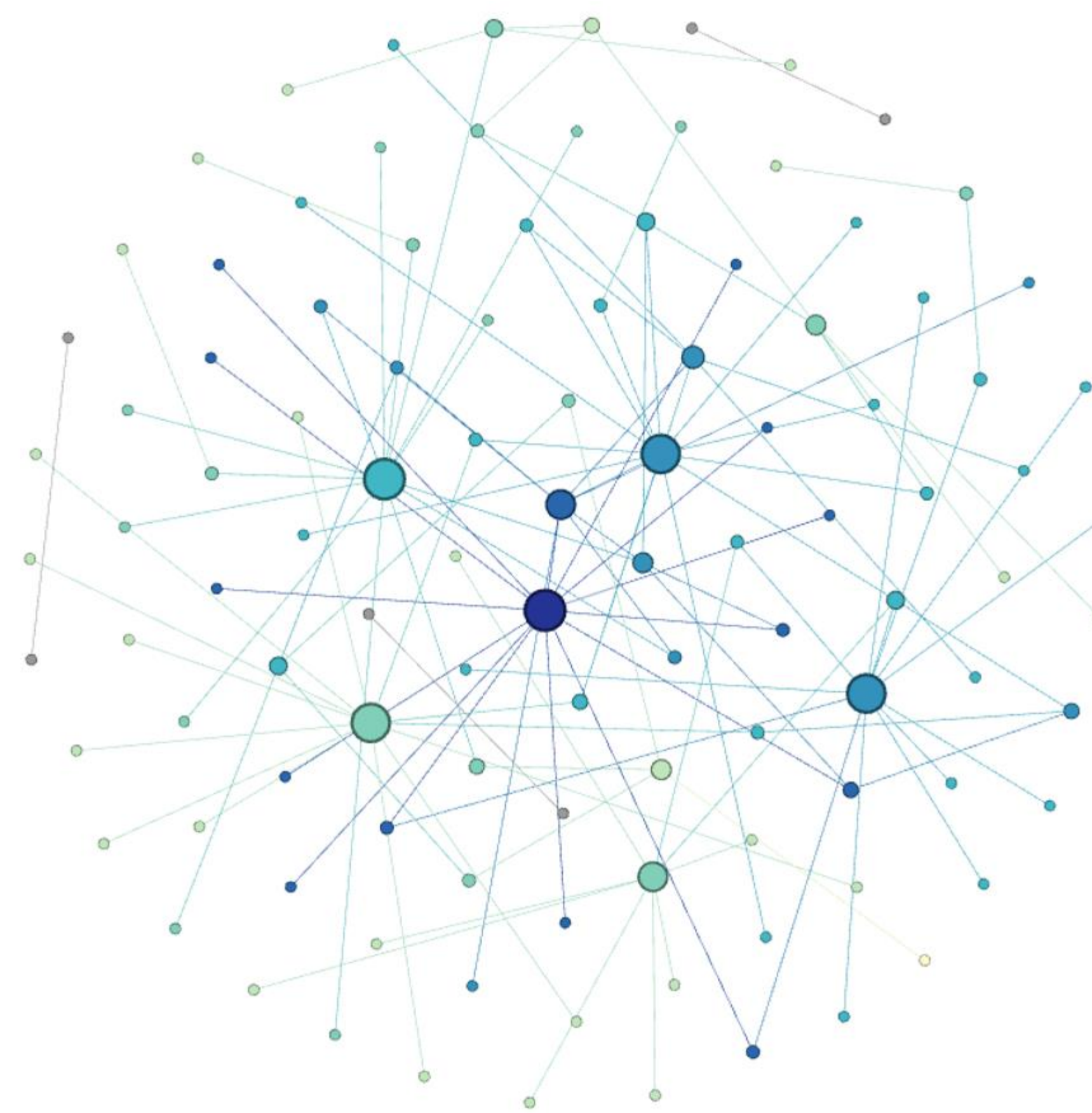
**Connectance:** 16.67%  
**Links per species:** 0.91  
**Number compartments:** 4  
**Shannon diversity:** 4.15  
**Extinção slope:** 1.10 (plants); 7.16 (pollinators)  
**Robustness:** 0.37 (plants); 0.85 (pollinators)



Major interaction  
Medium interactions  
Moderate interaction  
Moderately low interaction

### Plants and seed dispersers

**Connectance:** 4.76%  
**Links per species:** 1.12  
**Number compartments:** 4  
**Shannon diversity:** 4.78  
**Generality:** 3.79 (seed dispersers – plants)  
**Vulnerability:** 7.865 (plants – seed dispersers)



Major interaction  
Medium interactions  
Moderate interaction  
Moderately low interaction  
Low interaction  
Interaction with only one participant

## CONCLUSIONS

- In the first scenario, this means that if pollinator species are removed from the network, there will be greater impact on the functioning of the system.
- Second network demonstrates that dispersers exhibit a moderately generalist in their interactions, engaging with several plant species. On the other hand, plant species display a considerable dependence of seed dispersers.
- Based on these scenarios, strategic planting is recommended to support fauna and flora, enhance ecosystem services, improve water quality, and aid forest restoration, showcasing how integrated environmental management can mitigate impacts and promote sustainability in railway areas.

## REFERENCES

BASCOMPTE, J.; JORDANO, P.; OLESEN, J. M. The nested assembly of plant-animal mutualistic networks. *Proceedings of the National Academy of Sciences*, v. 100, n. 16, p. 9383-9387, 2003.

JORDANO, P.; BASCOMPTE, J.; OLESEN, J. M. The ecological consequences of complex topology and nested structure in pollination webs. In: WASER, N. M.; OLLERTON, J. (Ed.). *Plant-pollinator interactions: from specialization to generalization*. Chicago: The University of Chicago Press, 2006. p. 173-199.

